

Preparation of a Highly Selective Fluorine Adsorbent by Mechanochemical Treatment from Titanium Oxide

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In this study, we aim to prepare a highly selective fluorine adsorbent by mechanochemical treatment from two types of titanium oxides, rutile and anatase. Fluorine adsorption of the products from rutile and anatase by mechanochemical treatment increased for 60 min regardless of the ball diameter used in mechanochemical treatment, and fluorine adsorption of the products from rutile and anatase were 1.5 and 2.0 times higher than those of raw materials, respectively. With decreasing pH to 2-3, fluorine adsorption on products increased to the maximum at pH 2-3. The products can remove fluoride ion in seawater at pH 2, and fluorine adsorption behavior followed Langmuir model better than Freundlich model. Maximum adsorption amount of fluoride ion by products from rutile and anatase were 0.096 and 0.125 mmol/g, respectively. Regardless of the temperature the adsorption rates of products from rutile and anatase follow the pseudo-second order kinetic model than the pseudo-first order kinetics model. The adsorption on the products from rutile and anatase are the endothermic nature of the adsorption process and spontaneous reaction.

Keywords : Rutile, Anatase, Mechanochemical Treatment, Fluorine Adsorption, Seawater